Occurrences of cooperative breeding in the Masked Lapwing *Vanellus miles*

The Masked Lapwing *Vanellus miles* is a common ground-nesting shorebird inhabiting grasslands, paddocks, rivers, lakes, swamps and, tidal mud flats. It is particularly common in the urban areas of Phillip Island, Victoria (Dann 1981; Marchant and Higgins 1993). The Masked Lapwing usually lays between one and four eggs (the mean number of eggs per clutch of this study was 3.6 ± 1 SD) that hatch after 31 days. Both sexes incubate eggs, brood young and defend the eggs and young. Masked Lapwings produce precocial and nidifugous chicks that remain with the adults on defended territories until fledging (Marchant and Higgins 1993; Thomas 1969). The chicks are able to feed themselves within hours of hatching and rely on their parents only for protection (alarm signals) and warmth (brooding) (Marchant and Higgins 1993).

Here we report three instances of likely cooperative breeding of *Vanellus miles* on Phillip Island between 18 July and 13 September 2012.

Unusually Large Clutches

Observation 1

On 18 July 2012 a clutch containing six eggs was discovered. Four of the eggs showed a laying date around 7 July; these four eggs were significantly darker than the other two eggs. The other two much lighter coloured eggs displayed a float angle indicating a much more recent laying date, around 12 July. This slight but clear generational difference in eggs might mean that more than one female had laid eggs in this nest. We estimated egg age using the flotation method. Upon discovery eggs were carefully placed in a container of water and the angle at which the egg sat in the water column allowed us to estimate egg age using a generalised linear model constructed from eggs of known age (Cardilini 2010; Liebezeit *et al.* 2007). Three adult lapwings approached the investigator to within three metres making an aggressive display (Fig. 1), and three birds defended this nest on sub-

Fig. 1. Three *Vanellus miles* individuals defending a clutch of six eggs.

sequent visits. This is the first time that any of the investigators has observed defensive behaviour from more than two adults at a single nest. More than 200 nests were monitored during 2010 – 2012.

Observation 2

On 10 August a clutch containing eight eggs was discovered (Fig. 2), again these eggs were separated into two distinct laying dates based on their estimated age. It was not obvious how many parents were responsible for this nest.

Observation 3

On 15 August a clutch containing seven eggs was discovered. This clutch did not appear to have two distinct groups of laying date as the approximate egg ages indicated laying dates between 27 July and 4 August. Three adult lapwings were observed defending this nest; the investigator was swooped by three birds while attending the nest.

Retention of Young on Territory

On 15 June 2012 a chick of approximately one month of age was captured, banded, and flagged with a unique identifier placed on the tarsus. On 21 July the parents of this chick were observed to have laid another clutch (of four eggs) while the older chick remained with the adults. All four of the eggs in this clutch were observed to have hatched on 16 July; interestingly the older chick still remained with the young brood (Fig. 3). These birds were last observed on 25 July 2012. Only one of the young chicks remained; however, the older chick still remained with the young chick and two adults.

Although not the first records of nests with more than four eggs (see Marchant and Higgins 1993), these three nests with unusually large clutches, and the occurrence of multiple generations of young being retained on adult territory, provide some evidence of cooperative breeding in this species.

Fig. 2. A clutch containing eight eggs.

Fig. 3. An adult with two generations of chicks that have remained on adult territory.

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